of disease, which are by no means uniform in their power of resisting the action of a specific remedy.

Metschnikoff,[1] in 1892, called attention to the close analogy existing between the parasite of malaria and the coccidia, and regarded it as significant that carcinoma should closely approximate the category of miasmatic affections, as proved by its endemic character.

The conclusions that I have drawn from a careful study of this series of cases may be briefly expressed as follows:

1. The mixed toxins of erysipelas and B. prodigiosus exercise an antagonistic and specific influence upon malignant tumors, which influence in a certain proportion of cases may be curative.
2. This influence is slight in most cases of carcinoma (including epithelioma); most marked in sarcoma, but varies with the different types, the spindle-celled form showing by far the greatest influence.
3. The action of the toxins is not merely local in character, but systemic.
4. The toxins should be used only in clearly inoperable cases, or after primary operation to prevent recurrence.
5. The results will vary greatly with the strength of the preparation, the most virulent cultures giving the best results.

I desire to express my very great obligations to Mr. B. H. Buxton, Director of the Loomis Laboratory and Assistant Pathologist to the New York Cancer Hospital, who has spent much valuable time in preparing the toxins. I am also much indebted to Dr. E. K. Dunham, the Pathologist to the New York Cancer Hospital and Director of the Carnegie Laboratory, for the micro-photographs.

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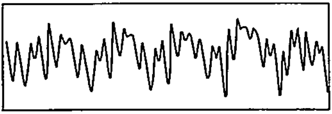
REMARKS ON THE BRUIT DE GALOP AND ITS CAUSATION.

BY THEODORE FISHER, M.D. (LOND.),
PATHOLOGIST TO THE BRISTOL ROYAL INFIRMARY.

MUCH interest surrounds most of the abnormal sounds heard over a diseased heart, but the majority of clinical observers possibly pass more or less lightly over the third sound which, interpolated between the normal first and second sounds, forms with them some variety of the bruit de galop.

The varied conditions under which it may appear and the many different characters it may assume seem entitled to give it a more prominent place among physical signs than it generally occupies. Perhaps one reason why many clinical observers merely note its presence without endeavoring to ascertain its significance is on account of its frequent transitory character. With others, again, the fact that they have no clear idea of its causation leads to lack of interest. They can give an explanation of the systolic or presystolic murmur, but not of the bruit de galop, so pass it by as unimportant. But while a definite explanation may be difficult, there can be no doubt that the bruit de galop or some variety of the triple sound occurs most frequently under conditions in which the muscle of the heart-wall suffers apart from valvular disease. Over hearts recovering from poisoning by toxins of diphtheria or typhoid fever, over dilated hearts also associated with interstitial nephritis, arteriosclerosis, excessive indulgence in alcohol or overwork, the bruit de galop is common, and it may also occur in cases of severe anæmia. In all such cases there is cardiac failure, due to impairment of power of the heart-muscle; but we naturally ask why should such weakness lead to the development of an interpolated third sound? It has been thought from its resemblance to an ordinary first sound to be due to asynchronous action of the two ventricles; in other words, it has been considered part of a reduplicated first sound. Most writers, however, strongly refute the idea of the possibility of such asynchronous action of the ventricles. But while this action may not be so impossible as the majority of writers have declared it to be, there is little evidence in favor of it as an explanation of the bruit de galop, and the fact that the abnormal sound frequently occurs without any reduplication of the second sound at the base would seem sufficient to negative such a view.

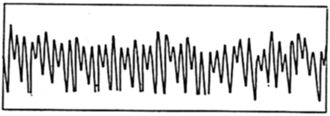
FIG. 1.



Tracing of heart impulse taken with Dudgeon's sphygmograph when a bruit de galop was present. Respiratory undulations are also present.

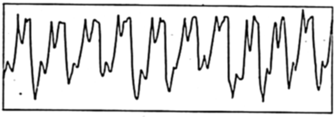
Yet some abnormality of cardiac action is obviously present, an abnormality that shows itself in the character of the cardiac impulse. The hand placed over the heart can, in the majority of cases, easily detect a rise preceding the ordinary impulse, and if the apex-beat is sufficiently forcible a cardiographic tracing gives marked evidence of the same abnormal rise. The following tracings illustrate this fact: the first (Fig. 1), taken from the impulse of a boy, aged fourteen years, with a large heart, associated with adherent pericardium, shows a high wave in the diastolic portion of the tracing. This is perhaps better shown in a tracing taken when the breath was held and the paper was running more slowly (Fig. 2). Both tracings were taken a few weeks before the boy's death, when a marked bruit de galop was present. Others taken several months previously, on former admissions to the hospital, show no such high abnormal wave in the diastolic portion (Figs. 3 and 4). The bruit de galop was not then present. Other tracings taken from the impulse of the dilated heart of a man, aged thirty years, who indulged freely in alcohol, show the same presence of a high diastolic wave with a bruit de galop.

FIG. 2.



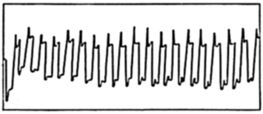
Tracing from the same heart; but breath held, and paper running more slowly.

FIG. 3.



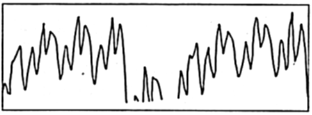
Tracing taken three months previously when no bruit de galop was present.

FIG. 4.



Tracing taken five months previously with Marey's cardiograph when no bruit de galop was present.

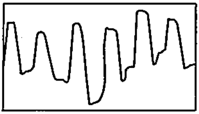
FIG 5.



Tracing taken with Dudgeon's sphygmograph from the impulse of a heart when a bruit de galop was present. The larger undulations are respiratory.

Fig. 5 was taken when a bruit de galop was well marked, and Fig. 6 five days previously, when no such abnormal sound was present. These tracings show the association of alteration in character of the cardiac impulse with the bruit de galop and confirm the experience of palpation that an abnormal rise precedes the ordinary normal upheaval due to systole of the ventricles. To what is this rise due? Potain and others have attributed it to distention of the left ventricle during inflow of blood from the contracting auricle. Distention of the ventricle by contraction of the auricle would explain the diastolic rise, but it is not obvious why that rise should be followed by a fall before the second rise due to systole of the ventricle occurs. One would suppose that the ventricle would remain distended and keep the chest-wall raised until the commencement of the ventricular systole, when a further rise would occur.

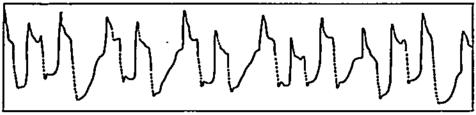
FIG. 6.



Tracing taken five days previously when no bruit de galop was present.

In other words, one would expect to see on a cardiographic tracing a ventricular systolic wave superimposed upon that due to auricular systole, and would not suppose that a deep negative wave would separate them. A glance at the accompanying figure may illustrate this point (Fig. 7).

FIG. 7.



Tracing taken from a heart-impulse with Marey's cardiograph, showing the rise of apex in diastole during intermissions.

It represents a tracing taken from over the heart of the boy already mentioned at a time when the pulse was intermitting, but no bruit de galop was present. During the prolonged diastole of the intermission the ventricle filled and raised the chest-wall, but when the diastole was of ordinary length the blood did not enter in sufficient quantity to produce such a rise. It is noteworthy, however, that the greater diastolic rise associated with the larger entry of blood during an intermission was not followed by a fall, and the tracing consequently shows a positive wave produced by this diastolic rise, with another smaller positive wave superimposed upon it due to systole of the ventricles, but there is no negative wave separating them.

The negative wave, which must indicate a temporary recession of the apex, appears, therefore, to be a marked feature of the bruit de galop and seems to indicate that some other factor, in addition to mere distention of the ventricles during systole of the auricles, must be at work in producing the abnormal impulse. Dr. Sansom[1] suggests that the inrushing blood first strikes the wall of the ventricle in the neighborhood of the apex, but that afterward a considerable quantity rebounds toward the base behind the great anterior mitral flap. It seems to the writer that some such movement of the blood may occur, but that the explanation given by Sansom is perhaps improbable. The entering blood will possibly in virtue of its inertia strike some regions of the ventricular wall more forcibly than others, but a large orifice with pliable edges like that of the mitral and its flaps is not likely to concentrate the force of fluid travelling through it. The blood will more probably be allowed to obey the laws of fluid-pressure and cause more or less uniform increase of tension within the cavity of the ventricle.

But while we believe that the auricular systole will not concentrate its force upon the region of the apex, it seems probable that this part of the heart-wall will be more exposed to the effect of increased intraventricular tension than other areas. A little consideration will show that the region of the apex is not protected in the way that the base is. In a dilated heart the chordæ tendineæ will be put on the stretch not only during systole of the ventricle, but also probaby during systole of the auricle. Most of these cords run diagonally inward and upward from each muscular pillar to be inserted in both mitral flaps, consequently outward pressure upon the flaps, while it widens the mitral orifice, will tend to draw inward the muscular pillars. These muscular pillars are more or less widely attached to the wall of the ventricle, and it follows that the tension of the entering blood will pull inward rather than force outward these areas of the heart-wall, and thus put a check upon its own distending force. The region of the apex, being the least protected, will tend to dilate most and the ventricle will possibly assume something of an ovoid shape.

That this distention of the region of the apex really occurs can be seen on examination of a dilated heart in the post-mortem room, and better still if the heart be stuffed, placed for a time in some hardening fluid, and afterward a portion of the heart-wall be cut away, the stuffing removed, and the cavity of the ventricle then examined. The bases of the musculi papillares, normally spreading their attachments nearly to the apex, will be comparatively high up on the wall of the ventricle, and the main enlargement of the cavity that has taken place will be seen to be situated below the bases of these pillars, in the region of the apex and lower part of the septum ventriculorum. We may, with some reason, assume that the dilatation in this region is largely due to strain put upon it during entering of blood from the auricle. The distention that produces this strain will, when palpable through the chest-wall, lead to the appearance of the high diastolic wave we have noticed in a cardio-graphic tracing. The negative wave that follows this high rise needs, however, to be explained. It has been mentioned that during systole of the auricle the mitral flaps are forced outward, and that this outward pushing of the flaps must, through the chordæ tendineæ, tend to draw inward the muscular pillars. The pressure of the inflowing blood will have one other effect. It will by its outward pressure upon the large mitral flap force that flap toward the septum ventriculorum and prevent blood in any quantity travelling upward past it toward the aortic orifice. This position of the large mitral flap and the comparative approximation of the musculi papillares tends, as we have seen, to throw the main distention upon the region of the apex and leads to a rise of the impulse during systole of the auricle. But when that systole is over there is no longer outward pressure upon the large mitral flap and no longer any restraint upon the musculi papillares; intraventricular blood-pressure is left to distend the heart as it will, which intraventricular pressure will cause rapid displacement of blood in the direction of the base, tending to throw the flaps together, and to fill the space between the large flap and the septum ventriculorum. This will cause diminution of blood in the region of the apex, and temporary recession of the impulse, leading to the production of a negative wave on a cardiographic tracing. The movement of the blood we have supposed to take place is the same as suggested by Sansom; but while Sansom attributes it to a rebound from the heart-wall, we have endeavored to show that changes in the position of intraventricular tension are the cause of the movement. We have been considering an abnormal cardiac movement that obviously exists, but it is the abnormal sound that attracts the attention of most observers. While, however, the causation of the ordinary heart-sounds still seems to be in some degree an unsettled question, one can hardly expect to be able to explain the bruit de galop, the abnormal feature of which is the presence of an added sound resembling a normal first sound. Potain believes this added sound to be due to distention of the wall of the ventricle by the auricular systole; Sansom, that it is due to sudden tension of the large mitral flap. Those who believe that the normal first sound of the heart is mainly muscular in origin may perhaps be inclined to accept the former view; those who think it originates in the mitral flap will adopt the latter.

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[1] Disease of Heart and Thoracic Aorta, p. 212.

In closing, I think it may be safely asserted that the triple sound occurs when the left ventricle, both ventricles, or sometimes it may be only the right ventricle, is more than normally distended during diastole. It is true that slight affections such as febrile disturbances in children may be sufficient to bring out a faint dull sound audible between the first and second sounds; but it is noteworthy that in such cases this sound frequently occurs only at the commencement of inspiration, when the ventricles must feel the negative intrathoracic pressure and tend to become more distended than at other periods of respiration, and it is reasonable to suppose that their muscular tone has been lowered by the fever, rendering them unable to cope with the distending forces.

Of the importance of this cardiac physical sign as regards prognosis, only those who have observed it carefully during long periods are perhaps able to express a definite opinion. That importance must, of course, depend largely upon the nature of the heart-failure with which it is associated.

In cases of hypertrophy of the heart without valvular disease the writer has seen the bruit de galop appear and disappear with little apparent alteration of general condition. On the other hand, it has been persistent for weeks and months until death has occurred, and in one instance was the only abnormal sign present where sudden death took place in a patient who was not considered seriously ill.

The fact that the bruit de galop may be sometimes transitory and of no great serious import, at other times permanent and apparently as much to be feared as the diastolic aortic murmurs, should, I think, give it an interesting if not an important place among abnormal cardiac sounds.

THREE CASES OF ESSENTIAL ANÆMIA IN ONE FAMILY—FATHER AND TWO DAUGHTERS.

By Wharton Sinkler, M D.,

and

Augustus A. Eshner, M.D.,

of Philadelphia.

The occurrence of a profound degree of anæmia in three members of one family—father and two daughters—with the development of symptoms of posterior spinal sclerosis and a fatal termination in one of the cases, would seem to be sufficient justification for detailing at length the history of this interesting group.

J. S., sixteen years old, who had for a time been a salesgirl in a store, presented herself at the Infirmary for Nervous Diseases, in the service of Dr. Wharton Sinkler, on October 28, 1895, when the following history was obtained:

Her father had died of locomotor ataxia and pernicious anæmia at the age of forty-five years. His history is hereto appended. The mother was living, about forty-five years of age, and was said to be also pallid and weak. On examination at a subsequent time she was found to be